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CROW ROOSTS AND ROOSTING CROWS.

BY SAMUEL W. RHOADS.

BY no means the least interesting topic in the life-history of *Corvus americanus* is that which relates to the roosting habits of this familiar and persecuted bird during six months of the year.

Throughout the breeding and rearing period which, in the Middle States, is almost cotemporary with the spring and summer months, the crow is not a gregarious bird, differing in this particular from its lesser kin, the blackbirds, which are eminently gregarious throughout the year; but as autumnal changes alter the face of nature and usher in new aspects of environment, the flocking habit becomes universal and the scattered families unite by common consent from the four quarters of their dispersion. The most casual observer cannot fail to remark the phenomenal increase in apparent number of crows in this latitude on the approach of winter. We may not account for this by referring it to the mere fact that flocking birds *seem* more numerous than they are in reality, nor is it possible that the immense assemblage of crows in the vicinity of Philadelphia during the winter season is composed solely of birds resident in the States of Pennsylvania and New Jersey. In the face of plain evidence to support such a conclusion, ornithologists generally ignore the fact of crow migration.

Undoubtedly the increase of crows at this season is largely due to accessions from the New England and Western States which join the thousands assembled from the interior of our middle districts. This migration, though "partial" and in some degree influenced by the comparative severity of winters, is none the less a typical one, a necessary provision for their self-preservation and a prime factor in the struggle of existence, even in a bird whose hardihood and tenacity of life have become almost proverbial.

Careful observation and inquiry convinces me that during winter a radial sweep of one hundred miles, described from the city of Philadelphia and touching the cities of New York, Harrisburg and Baltimore, will include in the day time, in its western semicircle, fully two-thirds of the crows (*C. americanus*) inhabiting North America, and *at night* an equal proportion in its eastern

half. The eastern area of this circle, with the exception of more fertile portions of West and North Jersey, is as notably devoid of them by day as it is infested by them at night. Their most extensive breeding grounds in New Jersey are well-nigh deserted during severe weather.

The popular local notion that crows all "go to Jersey to roost" and return to Pennsylvania to forage, while far from correct, has more truth in it than the average Jerseyman will admit.

The pine barrens and swamps of the interior afford but scant subsistence in winter, though providing ample summer accommodation to thousands, while on the other hand, the cultivated and more fertile portions of Delaware, Maryland, East Pennsylvania and West Jersey present an abundant winter supply of food-stuffs.

Another important factor in their choice of this district as a winter resort can best be understood by reference to the map, where it will be seen that nowhere on the Atlantic coast are the geographical conditions, both physical and climatic, more favorable to a supply of animal and vegetable food than in the four southernmost Middle States, whose wealth of bays, rivers, creeks and estuaries is unsurpassed in the United States.

The main object of this paper shall be to give a description of their nightly rendezvous, or "roosts," at this season of year in the afore-mentioned districts, adding thereto such deductions as are presented by a study of the history of such places, together with observations respecting the habits of crows before and after assembling at their roosting grounds.

It should be borne in mind by those unacquainted with the locality described, that it not only is preëminently a good feeding ground, but that it also furnishes, in the evergreen forests which skirt the shores of Delaware and Chesapeake bays and their numberless tributaries, a no less suitable shelter wherein to pass the night.

The literature of crow roosts is scant, modern ornithologists having virtually kept silence respecting this interesting phase of bird-life.

Wilson's description is probably the first published one available. It is as follows :

"The most noted crow roost with which I am acquainted," says he in his *American Ornithology*, "is near New Castle, on an

island in the Delaware. It is there known by the name of the Pea Patch, and is a low, flat, alluvial spot of a few acres, elevated but little above high-water mark and covered with a thick growth of reeds. This appears to be the grand rendezvous or headquarters of the greater part of the crows within forty or fifty miles of the spot. It is entirely destitute of trees, the crows alighting and nestling among the reeds, which by these means are broken down and matted together." He continues: "The strong attachment of the crows to this spot may be illustrated by the following circumstance: Some years ago a sudden and violent north-east storm came on during the night and the tide, rising to an uncommon height, inundated the whole island. The darkness of the night, the suddenness and violence of the storm and the incessant torrents of rain that fell, it is supposed, so intimidated the crows that they did not attempt to escape and almost all perished. Thousands of them were seen next day floating in the river, and the wind, shifting to the north-west, drove their dead bodies to the Jersey side, where for miles they blackened the whole shore. This disaster, however, seems long ago to have been repaired, for they now congregate on the Pea Patch in as immense multitudes as ever."

This account refers to some period in the last decade of the eighteenth century. In a foot-note to this we have the following, which appeared in a newspaper of the locality about the year 1800: "The farmers of Red Lion Hundred held a meeting at the village of St. Georges, in the State of Delaware, to receive proposals of John Deputy on a plan of banishing or destroying the crows." * * *

"Mr. Deputy proposes that for \$500 he will engage to kill or banish the crows from their roost on the Pea Patch and give security to return the money on failure." I am unable to find any other account of this remarkable roost, and am tempted to suppose that Deputy accomplished the herculean task and outdid the tempest and the deluge. Pea Patch was deserted long ago, *how* long it seems impossible to determine, but for the present I shall defer further comment on it to a future page and return to the literature of roosts in general.

Audubon relates, in his "Biography," a few particulars respecting the roosting of both species of crow (*C. ossifragus* and *C. americanus*), which appear as much based on Wilson's observa-

tions as upon his own experience. They are as follows: "At the same season (autumn) they (crows) retire in immense numbers to roost by the margins of ponds, lakes and rivers, covered with a luxurious growth of rank weeds or cat-tails. They may be seen proceeding to such places more than an hour before sunset, in long, straggling lines and in silence, and are joined by the grackles, starlings and reed-birds, while the fish-crows retire from the very same parts to the interior of the woods, many miles distant from any shores."

In his "Manual" we find Nuttall quoting from Wilson's account, adding thereto additional information of a roost on Reedy island, in the River Delaware.

By far the most complete and reliable account of the roosting habit of our crow is to be found in a little work entitled "Rambles of a Naturalist," by Dr. John Godman, who at one time filled the chair of anatomy at Rutgers's College.

Godman resided, about the year 1825, as country physician in Anne Arundel county, Maryland, which place afforded him ample opportunity for observing every phase of crow life throughout the year. Perhaps the best introduction I can give to the crow-rally or "round up" which always precedes their final bivouac for the night, will be in his words:

"About a quarter of a mile above the house I lived in, on Curtis's creek, the shore was a sand-bank or bluff twenty or thirty feet high, crowned with a dense young pine forest to its very edge. Almost directly opposite the shore was flat and formed a point extending in the form of a broad sand-bar for a considerable distance into the water, and when the tide was low this flat afforded a fine level space to which nothing could approach in either direction without being easily seen. At a short distance from the water a young swamp-wood of maple, gum, oaks, etc., extended back towards some higher ground. As the sun descended and threw his last rays in one broad sheet of golden effulgence over the crystal mirror of the waters, innumerable companies of crows arrived daily and settled on this point for the purpose of drinking, picking up gravel and uniting in one body prior to retiring for the night to their accustomed dormitory. The trees adjacent and all the shore would be literally blackened by those plumed marauders, while their increasing outcries, chattering and screams were almost deafening. It certainly seems that they derive great pleasure from their social habits, and I often amused myself by thinking the uninterrupted clatter which was kept up, as the different gangs united with the main body,

was produced by a recital of the adventures they had encountered during the last marauding excursions. As the sun became entirely sunk below the horizon the grand flock crossed to the sand-bluff on the opposite side, where they generally spent a few moments in picking up a further supply of gravel, and then arising in dense and ample column they sought their habitual roost in the deep entanglements of the distant pines."

Dr. Godman, after describing some of the methods employed by professional crow-hunters to secure these outlawed birds because of the price set on their heads by the State of Maryland during the years 1800 to 1804, inclusive, continues :

" But the grand harvest of crow-heads was derived from the invasion of their dormitories, which are well worthy a particular description and should be visited by every one who wishes to form a proper idea of the number of these birds that may be accumulated in a single district. The roost is most commonly the densest pine thicket that can be found, generally at no great distance from some river, bay or other sheet of water which is the last to freeze, or rarely is altogether frozen. To such a roost the crows which are, during the day time, scattered over perhaps more than a hundred miles of circumference, wing their way every afternoon and arrive shortly after sunset.

" Endless columns pour in from various quarters, and as they arrive pitch upon their accustomed perches, crowding closely together for the benefit of the warmth and shelter afforded by the thick foliage of the pine. The trees are literally bent by their weight, and the ground is covered for many feet in depth by their dung, which by its gradual fermentation must also tend to increase the warmth of the roost. Such roosts are known to be thus occupied for years, beyond the memory of individuals, and I know of one or two which the oldest residents in that quarter state to have been known to their grandfathers, and probably had been resorted to by the crows during several ages previous. There is one of great age and magnificent extent in the vicinity of Rock creek, an arm of the Patapsco.

" They are sufficiently numerous on the rivers opening into the Chesapeake, and are everywhere similar in their general aspect.

" Wilson has signalized such a roost at no great distance from Bristol, Pa., and I know by observation that not less than a million of crows sleep there nightly during the winter season. To gather crow-heads from the roost a very large party was made up, proportioned to the extent of surface occupied by the dormitory.

" Armed with double-barreled and duck guns which threw a large charge of shot, the company was divided into small par-

ties, and these took stations selected in the day time so as to surround the roost as nearly as possible.

"A dark night was always preferred, as the crows could not, when alarmed, fly far, and the attack was delayed until full midnight. All being at their posts, the firing was commenced by those most advantageously posted, and followed up successively by the others as the affrighted crows sought refuge in their vicinity. On every side the carnage then raged fiercely, and there can scarcely be conceived a more forcible idea of the horrors of a battle than such a scene afforded.

"The crows screaming with the fright and pain of wounds, the loud, deep roar produced by the raising of their whole number in the air, the incessant flashing and thundering of the guns and the shouts of their eager destroyers, all produced an effect which can never be forgotten by any one who has witnessed it, nor can it well be adequately comprehended by those who have not.

"Blinded by the blaze of the powder and bewildered by the thicker darkness that ensues, the crows rise and settle again at a short distance without being able to withdraw from the field of danger; and the sanguinary work is continued until the shooters are fatigued or the approach of daylight gives the survivors a chance of escape. * * * *

"During hard winters the crows suffer severely and perish in considerable numbers from hunger, though they endure a wonderful degree of abstinence without injury. Multitudes belonging to the Bristol roost perished during the winter of 1828-9 from this cause. All the water-courses were solidly frozen, and it was distressing to observe these starvelings every morning winging their weary way towards the shores of the sea in hopes of food, and again to see them toiling homewards in the afternoon apparently scarce able to fly."

This vivid portrayal leaves nothing to be desired in a description of roosting places in Maryland at that time. Let us now turn from this glance at the past, to a consideration of the present history of crow roosts in the Middle States.

My inquiries and correspondence regarding the Pea Patch roost, so far, result in nothing of interest further than the bare fact of the crows not having used that island within the memory of those whom I have addressed, nor have they even so much as heard of this roosting place, but all referred to Reedy island as being the only like resort in the locality.

Nuttall, referring to the subject, writes: "Whether this roost (Pea Patch) be now occupied by these birds or not, I cannot pretend to say, but in December, 1829, I had occasion to observe

their arrival on Reedy island, just above the commencement of the bay of that river (Delaware) in vast numbers."

One correspondent states that since the erection of Fort Delaware it would be impossible for crows to find a night's lodging on Pea Patch. Fortifications were begun there in the year 1814, and in 1860 the fort was greatly strengthened and became for the first time a place of importance. Summing up these facts I am led, in the absence of direct evidence, to believe that this noted roost was abandoned soon after the construction of Ft. Delaware was begun in 1814, and that the crows betook themselves to Reedy island as the most convenient substitute.

John Deputy's plan, whatever that was, of banishing the crows from their favorite island may have been successful ere the place became Ft. Delaware, but in case of his probable failure we may safely suppose an idle garrison of United States troops were not slow to improve their peculiar opportunities for rifle practice and midnight massacre on these feathered aborigines.

So far as my inquiries have gone, I find that here is an anomaly confined to two small islands in the River Delaware, which, for years unnumbered, have been the nightly resort of crows. We cannot assert that Reedy island was not used for roosting purposes in the time of Wilson, but it seems probable that we should have heard from him regarding it had it been so frequented, as the two places are but seven miles apart.

Such islands are not confined to the waters of the Delaware; why then such departure from a general rule in favor of using them alone? The reeds afforded a miserable substitute for pine boughs, and when they became broken down by the numbers accumulated upon them, we may well picture the misery of roosting on a mud flat in winter with the snow a foot deep.

The utter contrast between roosting on a reedy flat wholly devoid of other vegetation and subject to sudden inundation by the tide, and going to bed among the dense pine forests of New Jersey, is evidently beyond the comprehension of a crow, and may well tax the imagination of an uninformed man.

Mayhap in the first decade of the seventeenth century, ere Hudson had discovered Delaware bay, and when freshets, neap-tides and pale faces were not, crows may have rejoiced to get foothold for a night's rest on the peaceful shores of Pea Patch

island and to sleep secure from the nocturnal prowlers of the mainland pines.

To this decade we must revert for reasons which could not agree with the advanced civilization of a later century. But while we may account thus for the original impulse, wherefore should there be such provincialism among a few when there was ample chance and territory for the many to do likewise?

Were the Pea Patch and Reedy island crows Spartans or Helots in the corvine commonwealth? Did they transmit their predilections from father to son, or was caste determined by the query: "How do you roost, on Pea Patch island or in a tree?"

This may seem as mere child's prattle, yet it is worthy of serious conjecture, to say the least, whether sectional family traits are transmitted and obeyed by succeeding generations with as blind devotion and prejudice in birds as in man himself. Indeed, instances of heredity in tastes and anomalous predilections in the brute world are frequent and indisputable facts. As to their continuance through time until distinctive traits become gradually of generic consequence, we may well defer conjecture and await a more decisive answer in the future developments of scientific research.

Apropos of this question we may just here consider another, not wholly dissimilar, relating to the subject in hand and, as will be seen, involving the general principles of migration.

My residence is situated exactly in the track of the principal flight of crows which fly, evening and morning, to and from their roost, five miles distant and which is located near Merchantville, Camden county, New Jersey.

On a windy evening the birds fly very low, as they pass over open fields nearly brushing the surface of the ground with their wings.

On the west side of the house stretches a belt of woodland separated therefrom by an open field which the crows always traverse in their eastward course at night. This woodland is narrow, and as they approach its western boundary each crow elevates its flight sufficiently to pass among the tree-tops, and then immediately descends to a former level on reaching my field of observation. Birds therefore advancing on the farthest side of the wood cannot be seen nor can they see the course of those traversing the field.

One afternoon, it being very tempestuous, I stood by an open window to shoot the crows as they toiled past, but finding that effort fruitless, I sought more profitable diversion in watching their manner of flight. They appeared in long, straggling lines which were often separated by a distance of a quarter or half mile, and came along in detachments, each of which, as is always the case in such weather, maintained the utmost silence.

Having observed that the line taken by a certain detachment was not more than twenty feet in breadth, and that the whole company passed between certain shocks of corn, I felt curious to see the course of the next, which as yet had not appeared above the tree-tops. After the lapse of half a minute a solitary crow appeared, closely followed by three more, and all in like manner and with the common consent of a pack of hounds on the hot trail, pursued the invisible course of their predecessors among the trees, closed their pinions and stooped, as the others had done regardless of the buffeting winds, to the self-same track across the corn-field, and followed it. If every stone and shock and corn-stub had been a finger-post to mark the path of company A to Merchantville, those four sable pilgrims of company B could not have traversed "the desert and illimitable air" with more undeviating certainty nor have had a more unerring foresight of that Mecca of their weary hopes. Long did I watch this mysterious phenomenon, till darkness drew the veil. In miniature, thought I, have I seen a great and mystic phase of nature; migration in a nutshell. Now that we have something tangible to hammer at, let us seek the power and means to crack it and extract that kernel, long coveted by man; contented no longer to assign the honor of cracking such to a "future generation." A pack of hounds, closely following the scent, presents a tangible relation to the mind. We can conceive of an odor that touches earth and of olfactory powers sufficient to trace it thus, though we ourselves possess them not; nay further, we can comprehend the canine ability to scent, through sole medium of the atmosphere, across trackless districts and great distances, and now-a-days we should no longer hesitate to ascribe similar powers to vulturine birds, which in addition possess a wondrous gift of vision. May we deny the *latter* to the crow or dispute that the *former* sense is not only of every-day use to him (though in a modified degree)

but also to all birds. Not that I would infer that power of *scent* is of any considerable value in the migration of birds, nor would it be fair to assume that unaided vision is more than a prime factor therein.

'Tis mortal to take our observations from a human standpoint and refer all that goes beyond *human* attainment in the lower animals to "instinct."

Research in natural science as long since paid full penalty for her sins in this purgatory of original thought, and the time has fully come for us to advance into a higher sphere, querying the "what" and the "why" in the Emersonian assurance that "undoubtedly we have no questions to ask which are unanswerable." Phrenologically considered the crow has an excessive "bump" for locality in one corner of his wonderful memory, and size, color (?), form and calculation cluster about his knowing eyes. No less than Audubon long ago professed to have discovered that a crow can count five. Have modern ornithologists done as much?

Be this as it may, we have in our corvine methods of flight an important premise for the final understanding of the laws governing migration and of the so-called migratory "instinct," which is nothing more or less than the highly perfected sense or union of senses which enables migrants to traverse tracts of territory (which the uncultured, imperfect mind of man calls illimitable) with a precision which equals that of the wandering crow in finding its roost, or which a man exercises on a still smaller scale in the streets of his native town.

A North American Indian can form a far better conception of migration than a Yankee could, inasmuch as the former is by all odds the better explorer of trackless forests and boundless prairies. Would we have a "bird's-eye view" of this subject? Then by all means let us "take wings of fancy and ascend" to a point without the earth, though it be merely to understand how a place may be so far off "as the crow flies."

As yet our unfaith in aërial conquests has kept this inquiry of economic ornithology at a stand-still; but the spirit of Darius Green is again at work; may its leaven work mightily in the efforts of the A. O. U., through its committee on bird migration.

As yet no evidence is at hand to justify the supposition that the roosting place which Wilson and Godman have vaguely de-

scribed as situated "near Bristol" was in Pennsylvania. It seems more probable that it was located either on Burlington island or on the mainland near the site of the city of Burlington, in New Jersey.

Twenty years ago a colony of crows roosted on Newbold's island in the Delaware river, four miles north-west of Burlington island, and forty or fifty years ago another colony slept in a wood near Florence and, being disturbed, moved to another forest near Beverly which, within three years, has been deserted in turn for another site.

There is much to warrant the conclusion that the great roost described by Wilson was parent to this and many others now scattered over Burlington county, New Jersey.

(To be continued.)

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THE WINGS OF BIRDS.

BY I. LANCASTER.

WHILE engaged in ascertaining the methods employed by the soaring birds, on reaching a point where light began to break upon the obscurity, it became evident that the flight of all birds would be made comprehensible; that not only the day-long translation of frigate birds in circular paths high in the air, but the homeward passage of pigeons and the migratory flight of wild fowl, would emerge from the realm of fancy and range themselves with allied phenomena on the platform of recognized mechanical activities.

Indeed, many specimens of active wing flight have hitherto as completely baffled the best efforts of mechanical science as has soaring flight. When the weight of the bird is considered as resistance to be overcome by muscular force, flapping is incompetent to do the work required, and in spite of such effort gravity would compel motion in its own direction to the surface of the earth. The area of the two wings of a duck of four pounds weight, which is effective on the air in the down stroke is not more than two square feet. Counting one up and one down vibration as a single stroke, not more than three of these would be made in one second, and a liberal estimate would be an average of one foot of space traveled at each stroke for the entire wing surfaces. This ignores loss in the upward vibration. The effective work done on